ST. LOUIS CHILDREN'S AQUARIUM

EXPLORE THE WONDERS OF WATER AT MID-AMERICA AQUACENTER®

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8/25/00

Mr. John Wilson
U.S. EPA
Assessment and Watershed Protection Division (AWPD) (4503F)
1200 Pennsylvania Ave. NW
Washington, DC 20460

Dear Mr. Wilson:

I am commenting on PL 105-383. The purpose of my comments are to discuss specific implementation action items concerning research. I have attached as Exhibit #1 a description of St. Louis Children's Aquarium. Its three-fold mission is: 1) to operate a public visitation educational institution; 2) to be an applied environmental research organization and 3) to provide instruction to the community at large in education outreach regarding aquatic ecology, biodiversity learning, scientific literacy and global understanding.

My comments will cite a particular section within PL 105-383 *in italics* followed by my comments in response to Federal Register PL 105-383 Volume 65, Number 133 / Tuesday, July 11, 2000 / Notices page 42691:

"Furthermore, research and monitoring that supports the proposed remedies and goals in this plan, as well as resolution of uncertainties identified in the CENR Integrated Assessment and elsewhere, are identified as priorities for future action."

I believe the coordinated inter-governmental agency effort to develop a series of environmental models to predict ecologic states should be tied to a research and monitoring based goal. By using modeling systems not only can we provide predictive issues associated with chemical production and resultant environmental effects but also ground truthing using historical data and new collected data can provide future resolution.

"Because of the importance of enhancing these efforts by increasing support for necessary incentives, monitoring and research, this plan also identifies additional resource needs."

NOAA, NASA and the Department of Energy in association with other institutions have developed climatologic predictive modeling systems specific to the Mississippi River drainage system (GEWEX Global Energy and Water Cycle Experiment : GCIP Continental-Scale International Project). The climatological impact upon the Mississippi River system is directly associated with *in situ* chemical issues such as temperature, dissolved oxygen, pH, nitrogen load, and other soluble chemicals in the Mississippi River, in related estuarine and saltwater basins. The predictive capacity for these chemical fluxes will have resultant aquatic, agricultural, and urban effects. This type of inter-agency coordination, I believe, will yield a more desirable product. This information product can also be returned to stakeholders through education at the community level, interdiction at the production level, protection at the resource level and a myriad of other control point interactions within the stakeholder model.

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"#1 By Summer, 2001: the Task Force will establish sub-basin committees to coordinate implementation of the Action Plan by major sub-basin, including coordination among smaller watersheds and States in each of those sub-basins;"

I would be happy to provide input to the coordinating committee or sub-basin committee and suggest that as early as possible laboratory models based upon mesocosm-level simulation be done to establish target reduction levels. This type of mesocosm model assessment can also be used in determining other physical, chemical and biological processes that affect the cause-and-effect relationships between nutrient inputs and resulting environmental quality.

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*"*Implementation of the Environmental Quality Incentives Program (EQIP) to assist grain and livestock producers in reducing excessive nutrients' movement to water resources;"*

Recent studies on livestock feed have shown that for some nutrient requirement-based recipes, the actual nutrient levels can be lowered to achieve the same nutrition. The pass-through of the excess nutrients from feed into waste rather than feed into meat may provide a significant reduction in the loading effect on the water resource. Therefore, more research should be done in this area. We would recommend that the issue be co-related to aquaculture and other agricultural practices as well.

"Adaptive Management: Action, Monitoring and Research"

I disagree with the idea that changes in stakeholder actions will require *"decades for demonstration that remedial actions have helped the recovery of oxygen concentration in the*

Gulf..." I believe that by utilizing mesocosm research, modulation of changes resulting from research-based law enforcement will have effects that can be seen on an annual basis.

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"Education"

I believe that it is important in educating the stakeholder to include K-12, university level and community-level participants. This can be accomplished by involving educational institutions such as St. Louis Children's Aquarium in the distribution of the information. By contexting this information within formal and informal educational settings, the capacity of the information to be more widespread is heightened. I would be happy to participate in developing information modalities associated with this important issue to informal and formal education institutions.

*"...*Research and Modeling"*

As mentioned previously, a mesocosm system for evaluating the *"processes that underly the causes and effects of the hypoxic zone"* will allow for elemental understanding towards developing predictive models.

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"It must quantify environmental trends and differentiate climate, streamflow, nutrient and landscape management measures, Gulf hydrodynamics, and other concurrent factors. Variables should be measured to quantify the physical, chemical and biological processes that affect the cause-and-effect relationships between nutrient inputs and resulting environmental quality."

The use of mesocosm modeling and testing of various situations from the experimental standpoint will allow for developing strategy towards Environmental Quality.

"Analysis and interpretations must use models that integrate knowledge across scales and hydrologic compartments from the smallest watershed to the Mississippi and Atchafalaya River Basin and the Gulf of Mexico."

UNESCO has developed a model program whereby the scientist, the stakeholders, and the lawmakers unite in a shared modality, this is referred to as the H.E.L.P. program. I would recommend the use of this model in the strategic implementation of PL 105-383.

"Bottom-dwelling communities in the current hypoxic zone in the northern Gulf return to a diversity and abundance characteristic of non-hypoxic conditions and normal migratory

patterns of key species are restored."

Many times in environmental assessment, non-food/non-game species are excluded from studies. In our understanding, the word "diversity" corresponds to the entire spectrum of species ranging from the smallest diatom to the largest mega-mammal that participates within a defined eco-community. Recent public issues associated with interfacing biologic capacity in conjunction with legal mandate leaves the scientist out of the equation. It is my recommendation, because of the significant science base of this issue, that a multitude of scientists in a consensus-based management system be allowed to participate in the findings associated with each of the levels of this legal implementation as well as inclusion of other stakeholder levels.

I hope these comments will be helpful regarding the future actions on this important issue. Please contact me at (314) 647-6011 if you have any questions or if there are ways we can assist this effort further.

Sincerely,

Leonard A. Sonnenschein
President

cc: J. Charles Fox

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EXHIBIT #1

At St. Louis Children's Aquarium, aquatic ecology, biodiversity learning, scientific literacy and global understanding go hand in hand in several ways. Exhibits and interpretation materials as well as docent-led guided tours are focused on hands-on interactions within re-creations of living ecosystems replicant of Mississippi River, Amazon River and oceanic biota.

With more than 10,000 living animals displayed at St. Louis Children's Aquarium in more than 125 living exhibits and several hundred nonliving displays to surround children and other visitors, the idea of immersion learning in a non-traditional educational environment takes on new meaning. In addition to the displays, St. Louis Children's Aquarium is playing a leading role in ecosystem investigations and sustainable development through its on-site and off-site field-based research programs.

Successful educational programs developed by the Aquarium in the St. Louis community have led to extensions of these instructional programs in several Caribbean, Central and South American communities. Commercial development of aquaculture and agricultural activities to increase crop production without risk to the environment are planned in the near future based on studies done at St. Louis Children's Aquarium.

Staff from St. Louis Children's Aquarium regularly participates in testimony associated with nuclear reduction, management of river systems, scientific literacy planning, environmental activities, global policy and educational reform. St. Louis Children's Aquarium staff are also active in teacher training by providing direct instruction to teachers, educational hand-outs correlating activities done at the aquarium and in outreach programs which meet International, National, State and Local educational curriculum standards.